DOCUMENT RESUME

ED 164 404 SO 011 395

AUTHOR	Campbell, Sally R.
TITLE	An Educator's Guide to the Three Es: Energy, Ecology, Economics.
INSTITUTION	Sears, Roebuck and Co., Chicago, Ill.
PUB DATE	78
NOTE	19p.
AVAILABLE FROM	Terry J. Finlayson, Sears, Roebuck and Co., D/703 Sears Tower, Chicago, Illinois 60684 ($0.50 paper copy)
EDRS PRICE	MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS	Concept Teaching; *Curriculum Development; Depleted Resources; *Ecology; Economic Climate; *Economics; Educational Objectives; Elementary Secondary Education; *Energy; Interdisciplinary Approach; Learning Activities; Natural Resources; Policy Formation; *Relationship; Relevance (Education); Resources; *Social Studies; Student Participation; Teaching Guides; Water Resources

ABSTRACT

The booklet presents concepts, generalizations, background information, and learning activities for use in elementary and secondary school programs on energy, ecology, and economic issues. Major objectives of the resource guide are to help students understand problems related to the energy situation and to promote constructive changes in attitude and behavior in dealing with the energy challenge. Learning activities involve students in discussing key concepts such as fuel supplies and energy policies, defining terms, taking multiple-choice tests, writing research papers, identifying conservation measures, devising steps to implement energy conservation, participating in group projects, drawing cartoons, posters, and energy timelines, debating energy policies, and setting up water and energy saving guidelines. Grade level is identified for each learning activity. A directory of private organizations and government agencies involved in economics and/or ecology and energy concludes the booklet. (DB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED164404

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
Terry J. Finlayson
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

SEARS EDUCATOR RESOURCE SERIES

An Educator's Guide to the Three Es:

ENERGY/ECOLOGY/ECONOMICS

By Sally R. Campbell

NOTE: Permission is hereby granted to educational institutions to reproduce protions of this manual for individual classroom instructional purposes. Other reproduction of this material is not permitted without the express written consent of Sears, Roebuck and Co.

50-01139

©Sears, Roebuck and Co., 1978

An Educator's Guide to
The Three Es:

ENERGY, ECOLOGY, ECONOMICS

By Sally R. Campbell

About the author:
Sally R. Cambell is a consultant on consumer education and consumer affairs whose articles appear frequently in professional publications. She is the author of the Sears Consumer Information Services resource guides, "Age of Adaptation" and "Our Economic System: Essays and Teacher's Guides."

Few people today dispute the fact that our country faces an energy problem. Within a relatively short time our once cheap and abundant supplies of crude oil and natural gas fuels have become scarce and costly to produce and even more costly to import. Demand continues to increase while supplies steadily dwindle. Yet both our economy and our way of life depend heavily upon these fossil fuels.

To date, totally acceptable alternative sources of energy remain to be developed. Neither have we launched an effective conservation program to make existing fuel supplies last until readily available, safe and economical new sources of energy can be found. Nuclear energy, with its great potential, has limited value as a near term solution because of current regulations and the problems it poses to the environment.

Other possible solutions to the energy situation also carry ecological impact. Both the use and production of oil and coal have their environmental consequences. Burning most fuels —whether by automobiles, factories, utility plants, homes, schools or offices—pollutes the air.

Emission controls to counteract pollution lessen the efficiency of burning fuels. They also promote increased fuel consumption and increase industrial production costs. Oil spills from offshore drilling pollute the water while indiscriminate strip mining for coal destroys the land.

But perhaps the greatest impact of the current energy situation is based upon the central economic problem of scarcity as expressed in the law of supply and demand in the marketplace.

When demand for any item is greater than supply, prices usually go up. Higher prices provide the economic incentive to increase the supply and at the same time serve to dampen demand.

In the case of the energy situation, higher fuel prices make it economically attractive to develop other energy resources which help hold demand in balance with scarce supplies. Of course, in a mixed economy such as ours, other factors come into play including government regulations, tax and other incentives, politics, and the possibility of rationing or price controls.

In our energy intensive economy, fuel scarcity coupled with increased demand aggravates any number of other economic problems. Inflation is a current example. Rising fuel costs increase the price of all the goods and services which depend on fuel for their production and distribution.

Unemployment is another example. As fuel becomes more scarce and costly, production costs increase and the capital available for new plants and equipment decreases. This, in turn, means less expansion by industry and fewer jobs for workers.

Trade deficits and the falling value of the dollar in world markets are also directly related to the short supply and high demand for fossil fuels. As we import oil at higher prices without a corresponding balance of exports, we have a trade deficit. In other words, when we buy more than we sell in world markets, the U.S. loses purchasing power for its dollars or, in economic terms, the dollar is devalued.

These are just a few of the many ways energy, ecology, and economic problems interact to have an impact on our daily lives. To help students investigate each issue and explore the attendant problems and alternatives, this educator resource publication was developed to serve as a guide to:

- introducing basic concepts on energy, ecology, and economics and the interaction among the three.
- understanding some of the challenges and problems related to the energy situation.
- identifying possible and appropriate action that could be taken in solving some of these problems.
- promoting constructive changes in attitude and behavior in dealing with the energy challenge.

STUDENT GOALS

As a result of studying the energy issues and their impact upon our environment and economy, students should be able to:

- define basic terms used in discussing energy, ecology, and related economic concepts.
- understand how supply and demand affects energy, including its sources, patterns of usage, and predicted future outlook.
- identify ecological concerns related to energy and possible action to take in protecting the environment while meeting needs for energy.
- describe the challenges facing the U.S. and the world concerning energy resources, ecology, and economics.
- analyze the interrelationship among energy, ecology, and economic problems and solutions and the various ways each affects the others.
- identify the consequences of failing to deal with the challenges in the areas of energy and ecology.
- propose a plan of action for individuals to follow in helping to solve the problems presented by energy shortages, threats to the environment, and related economic dislocations.
- evaluate the procedures and results of public policy making in the areas of energy, ecology, and economics.

CONCEPTS AND WORDS TO KNOW

As students explore the interrelationship between energy, ecology, and economic issues, key concepts help to provide a framework for organizing and using the subject matter. A common knowledge of certain words and phrases also facilitates learning and discussion.

The following concepts and words to know include introductory ideas and terminology related to study of the three Es.

Key Concepts

Fossil fuel supplies do not meet demands.

Ecological balances are threatened.

Energy and ecology problems are related.

Solutions and policies for energy and ecology problems carry economic impact and consequences.

Meeting the challenges of the three Es calls for informed citizens and voters who are willing and able to act responsibly.

Words and Phrases to Know

ENERGY TERMS

black-out
British Thermal Unit
brown-out
coal conversion
electricity
energy efficiency ratio
energy intensive
fossil fuels
fuel
gasification
geothermal energy
heating oil
hydro-electric
insulation
liquification
natural gas
nuclear energy
offshore drilling
OPEC
petrochemical
petroleum
plutonium
power
primary source
pyrolysis
secondary source
shale oil
solar energy
strip mining
voltage cutback

ECOLOGY TERMS

aeration
by-product
carbon monoxide
clean fuel
conservation
contaminate
ecology
emission
environmental protection
erosion
high sulfur
land disruption
low sulfur
ozone layer
pollutants
pollution control devices
radiation
radioactive waste
recycle
solid waste
sulfur dioxide
thermal pollution
water table

ECONOMIC TERMS

abundance
allocation
balance of payments
capital intensive
cartel
competition
demand
depression
domestic
economic growth
embargo
export
import
inflation
labor intensive
oligopoly
price
price controls
prosperity
rationing
recession
research and development
reserves
scarcity
supply
surplus
trade deficit
trade offs
unemployment
value of the dollar

4

GENERALIZATIONS

A generalization refers to a basic truth or factual statement which is universal to individual concepts. The following generalizations are presented as a core of information related to energy, ecology, and economic issues upon which students can base further inquiry, research, and value judgments.

Available, usable energy, particularly in the form of fossil fuel, is not expected to meet future demands of the U.S. or of the world.

The energy shortage brings us to terms with the basic economic concept that resources are limited and interrelated.

As the population increases, competition for energy and other natural resources will increase while supplies of those resources will decrease.

Establishing priorities for the use of scarce resources will become increasingly important as demands escalate.

Conservation, coupled with emphasis on developing new energy resources, offers the most reasonable and practical immediate approach to the energy problem.

New attitudes and altered lifestyles will be necessary to conserve energy and eliminate the waste of resources.

The combined, cooperative efforts of all Americans will be required to meet the challenges of energy shortages over the next few years.

New energy sources and the technology for developing and using them offer the only long-range solution for meeting world energy needs.

Certain methods of conserving energy and increasing energy production pose threats to the environment.

Conflicts between protecting the environment and meeting energy demands center on standards and restrictions related to strip mining, offshore drilling, auto emission controls, pipelines, oil spills, nuclear waste, and pollution connected with energy use and production.

Energy costs will escalate as a result of costs for pollution controls and environmental protection.

Our economic system is highly dependent on an adequate supply of energy.

Economic problems related to energy shortages include inflation, unemployment, trade deficits, and the falling value of U.S. dollars in world markets.

Shortages of domestic fuel supplies necessitate fuel imports, which without a corresponding balance of exports, result in a trade deficit and a decline in the value of the U.S.dollar in world markets.

The ultimate goals of any long-range energy policy will include an adequate, reliable energy supply at the lowest possible cost consistent with necessary environmental safeguards and with minimum economic dislocations and inequities within a framework of international cooperation.

Research and development will eventually lead to new sources of energy.

Natural fuel resources are not evenly distributed among nations and geographic areas.

An equitable world-wide distribution of scarce energy resources will depend largely on successul negotiation and cooperation among countries.

Energy problems may result in new legislation and increased government involvement which will affect commerce and industry as well as private citizens.

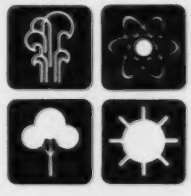
There are many ways for individuals to reduce their use of energy without serious consequences for the overall economy.

Conservation measures involving some inconvenience and discomfort are preferable to measures which involve serious economic dislocations such as plant shutdowns, layoffs, and massive unemployment.

Conservation practiced by consumers and commercial establishments may produce fewer serious economic consequences than cutbacks in industrial uses of energy.

Individual efforts, when taken collectively, can result in substantial conservation of energy and other scarce resources.

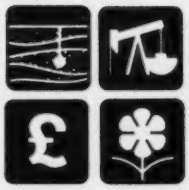
Many uncertainties surround the supply of energy including the political situation, legislation, economic conditions, environmental concerns, technology, and effectiveness of conservation measures.



INTRODUCING ENERGY, ECOLOGY, AND

Pretests

Pretests can be successfully used to involve students in new topics. The completion exercises that follow have no **right** or **wrong** answers, but merely serve to stimulate thought and inquiry processes. The multiple choice questions cover basic facts on the three Es and are a way to determine students' familiarity with the material.



Completion: Ask students to complete the following statements quickly, briefly, and without concern for **right** answers. Consider what their answers reveal about student attitudes and understanding. Follow up with discussion and research into areas of most interest and importance.

1. The toughest energy conservation measure for me would be...
2. Three things I would do willingly to conserve energy are...
3. Three things I would do willingly to protect the environment from energy using and producing threats are...
4. To me the worst thing about an energy shortage is..
5. If I had the authority to make laws for energy conservation, three laws I would make are...
6. Five appliances my family and I could use less to conserve energy are...
7. The most important thing I think government could do about energy shortages is...
8. I would be willing to relax environmental standards to produce more energy only if...
9. I think fuel rationing would be hardest for...
10. I think reducing demands for energy by increasing prices would be hardest for...
11. I think we could reduce the demand for energy by...
12. I think the best source of energy to develop for the future is _____ because...
13. The three greatest difficulties in increasing production of energy are...
14. The most significant three things consumers can do about energy, ecology, and related economic problems are...
15. In my opinion, the three most serious consequences of ignoring energy and related ecology problems would be...

Multiple Choice: Ask students to answer the following multiple choice questions. Check their answers to learn how much they know and understand about energy, ecology, and related economic problems. The following is based on material available from the U.S. Department of Energy.

___ 1. Fossil fuels include all of the following except:
a) coal c) oil
b) natural gas d) wood

___ 2. The primary source of energy that meets the greatest percent of U.S. energy demands is:
a) coal c) natural gas
b) nuclear d) oil

___ 3. The group using the largest share of U.S. energy is:
a) industry
b) residential
c) transportation
d) commercial

ECONOMIC ISSUES

___ **4.** According to estimates, at current levels of use the U.S. has enough coal to last approximately:
a) 50 years c) 150 years
b) 500 years d) 350 years

___ **5.** The amount of oil **used** in the U.S. as compared to the amount **produced** is:
a) only as much as
b) slightly more than
c) only half as much
d) almost twice as much

___ **6.** Consumer products made from petroleum include all but:
a) plastic wrap
b) synthetic leather
c) acrylic knits
d) batteries
e) pet food
f) detergent

___ **7.** Disadvantages of solar energy include all but:
a) difficulty of storage and transportation
b) technology not fully developed
c) pollution of air and water
d) high expense of installation for both new and existing structures

___ **8.** For its oil supply, the U.S. imports from the Organization of Petroleum Exporting Countries (OPEC) approximately:
a) 30 percent
b) 50 percent
c) 70 percent
d) 90 percent

___ **9.** The primary economic problems resulting from ever-increasing oil imports and ever-increasing prices is:
a) trade deficit
b) unemployment
c) recession
d) short supply

___ **10.** Ways to dampen the demand for oil could include all but:
a) rationing
b) letting prices go up as supplies dwindle
c) government price controls
d) tax and price penalties for heavy users

___ **11.** In American homes the greatest amount of energy is used for:
a) lighting
b) heating and cooling
c) electric appliances
d) gas appliances

___ **12.** The disadvantages of turning to nuclear energy as an alternative to fuel oil include all but:
a) high cost of developing and building breeder reactors
b) high levels of radioactive waste
c) inefficiency of nuclear fuel
d) the plutonium by-product which is used for atomic bombs and must be isolated and protected from theft

___ **13.** The home appliance using the highest number of kilowatt hours per year is a:
a) range
b) frostless freezer
c) water heater
d) color television set

___ **14.** Fuel conservation by consumers for their homes and cars causes fewer economic problems than conservation by business and industry because:
a) consumers make up the least important sector of the economy
b) consumers waste more energy than other fuel users
c) significant energy cutbacks by business and industry would result in fewer jobs and lower productivity
d) consumers use more energy than business and industry

___ **15.** Measures for conserving fuel in the home include all but:
a) insulating properly
b) installing storm windows and doors
c) extensive use of a fireplace
d) laundering in cold water and limiting the use of a dishwasher

Answers to multiple choice:

1-d	6-e	11-b
2-d	7-c	12-c
3-a	8-c	13-c
4-d	9-a	14-c
5-d	10-c	15-c

DISCUSSION QUESTIONS

The following questions can lead to discussion, debate, and research on energy and its relationship to our environment and economy. Choose the questions most appropriate for your group depending on your subject matter area, the background and knowledge of your students, and the way you plan to use the questions.

1. In what ways might an energy shortage affect family life? Think in terms of benefits, hardships, and end results.

2. How can we expect lifestyles to change as a result of an energy shortage? Discuss how these changes might affect individuals in the classroom.

3. In what ways might we as a nation benefit from an energy shortage? Classify benefits under headings such as social, economic, political, environmental, and moral.

4. How can an energy shortage cause unemployment, business failures, recession, and possibly a major depression?

5. What are some measures we can take to minimize the economic consequences of an energy shortage?

6. How would you view the energy shortage if you were:

- building a new house
- buying a new or used car
- considering a change of location to another part of the country
- planning your future career
- planning the size of your family
- retiring on a moderate pension
- manufacturing electric appliances
- managing a large utility company
- the manager of a store in a shopping center

7. What are 15 things individuals can do to conserve energy? Classify conservation measures according to (1) use of car; (2) use of appliances; (3) heating and cooling the house; (4) new purchases; and (5) changes in lifestyle. What steps can individuals take in each of these areas to protect the environment?

8. What conflicts are likely to arise as we struggle to meet demands for energy and to protect the environment? Cite specific examples.

9. What are some of the proposed government measures for dealing with the energy situation? For protecting the environment? Discuss the pros and cons of proposals that you have read something about.

10. Energy conservation measures can be categorized as immediate, short term, and long range. What are three examples of each?

11. What can commercial establishments do to conserve energy? How would these measures affect employes, customers and management?

12. Why are many of the energy conservation measures directed at consumers and residential use of energy when this segment of the economy uses the smallest percentage of fuel?

13. What six countries in the world possess the highest oil reserves and what is the current political relationship of the U.S. with each of these countries?

14. Under what conditions can self-sufficiency in meeting this country's energy demands become a possible goal? What steps or developments would be necessary? How long might it take to achieve? What sacrifices might be necessary?

15. How might an energy shortage affect the average consumer's future purchasing decisions? Explain and give examples to illustrate.

16. What consumer products would likely to be in short supply as a result of an energy shortage? Why?

17. What other countries are also facing an energy shortage and what countries are in a position to gain from the energy situation?

18. How is government power and regulation likely to increase because of the energy situation and how might this increased government power affect business and individual citizens?

19. How can the following businesses and industries contribute to solving energy and ecology problems?

- utility companies
- airline companies
- insulation manufacturers
- oil companies
- construction companies
- auto companies
- major retailers
- chemical companies

20. What five changes would you personally be willing to make to conserve energy? To protect the environment? To improve economic conditions?

21. What role do you think government should play in conserving energy, increasing production of energy, protecting the environment from threats related to the use and production of energy?

22. What immediate and future consequences are likely to develop if we fail to deal constructively and effectively with energy, ecology, and related economic problems?

SUGGESTED LEARNING EXPERIENCES

23. What type of economic impact and challenge has the world demand for fuel created in the countries making up OPEC?

24. What are some of the advantages and disadvantages of the OPEC nations' investments in U.S. businesses and land?

25. How and why should the U.S. maintain friendly relations with OPEC nations?

26. Water shortages are a recognized problem in many sections of the country today. Some predict disastrous water shortages in the future. Assuming these predictions to be true, review the preceding questions and apply them to a water shortage rather than energy. In addition, discuss the following questions directly related to water supply and demand.

- In recent years, where have water shortages been a problem and what have different geographic areas done about it?
- What are some water-saving devices that can be used in homes, schools, and commercial businesses?
- What is the status of the desalinization technology and does it relate to the energy situation?
- What are some of the more serious economic problems that could grow out of severe water shortages?
- Approximately how much water does the U.S. use annually and how does it break down among different groups of users, particularly residential, commercial, industrial, and agricultural?

Individual and group projects and activities give students an opportunity to become involved in learning about the energy situation. Individual activities are particularly useful in adapting material to meet individual needs, abilities, and interests. Group projects may be carried out by the class as a whole or by small groups or teams within the class.

Choose projects that are most appropriate for your individual students or for your group and for the concepts you are teaching.

Individual Student Activities

1. Investigate and report on ways consumers can conserve energy with home appliances, especially in their purchase, use and maintenance.

2. Find out what features on appliances consume extra energy. Discuss the benefits of each feature versus the added operating costs and energy consumption.

3. Investigate and report on the steps to conserve energy that manufacturers and retailers of home appliances can take in the design, marketing, promotion and advertising, and in educating consumers in the proper use of those appliances.

4. Study and discuss the pros and cons of legislation calling for efficiency ratings on home appliances.

5. Write an advertisement for three major home appliances that recognizes the need for efficient operation and energy conservation.

6. Explain at least three ways that the energy and ecology situations relate to each of the following economic conditions:

Inflation
Trade deficits
Value of the American dollar
Unemployment
Productivity

7. Bring to class at least three articles from current newspapers and magazines covering some aspect of the relationship between energy, ecology, and economics. Topics may include environmental and cost factors in mining coal or offshore drilling, environmental protection standards applied to the use of high sulfur coal, measures for conserving energy without closing businesses and schools, etc. Research the unsolved problems presented in the articles for a fuller understanding of the issues involved.

8. Draw up a list of at least five things you personally would be willing to do or not to do to conserve energy and protect the environment from energy-related pollution.

9. Conduct a research project to learn what three consumer energy conservation measures would save the most energy:
a) in home heating and cooling
b) in use of home appliances.
c) in use of private automobiles.

10. Conduct necessary research to learn about and report back to the class on at least two types of pollution caused or aggravated by different types of energy production.

11. Where they apply, carry out the preceding projects as they relate to water rather than energy shortages. Use the following projects as well, particularly if you live in an area where water supplies are at issue.

- Compare energy shortages to water shortages in terms of:
  —current and predicted supply and demand situations

—environmental concerns
—economic impact
—possibilities for individual, group and government action
—impact on lifestyle

- Find out at least ten steps we can take to:
  —conserve water supplies
  —allocate limited supplies fairly
  —increase supplies of pure water

Group Projects

1. Form an energy conservation task force to explore ways to save energy in the school, in the home, and in the community. Set up and distribute conservation guidelines based on the findings.

2. Set up an energy information center to provide data on conservation, supply and demand, research and development, government agencies dealing with energy needs and legislation related to energy and fuel.

3. Develop a series of bulletin boards using pictures, articles, and clippings from current magazines and newspapers which depict both the current and the future energy situation as well as related ecological and economic conditions.

4. Conduct a school or community-wide survey to find out how different individuals and families are reacting to the energy situation and what they are doing about it. Summarize and report the findings.

5. Have a brainstorming session on ways to inform and motivate the public to conserve energy.

6. Hold a conference on "The Economics of Energy." Call in experts to present the economic aspects of:

- conservation
- conflicts between energy production and environmental protection
- development of new sources of energy
- the energy shortage in the United States
- government policies related to energy

7. Set up several debate teams to research and argue the following or related points:

- offshore drilling versus environmental protection
- fuel rationing versus increasing prices to cut demand
- voluntary versus mandatory conservation measures
- benefits of nuclear reactors versus risks

Try to bring out all of the advantages and disadvantages of each position during the debate.

8. Divide the class into four groups each to represent policy makers for government, for business and industry, for environmentalists, and for consumers. Ask each group to recommend at least five things it would do to:

- reduce America's dependence on foreign oil.
- protect the environment while developing new sources of energy and increasing energy production.
- dampen demand for energy and encourage conservation.
- arrive at the fairest possible distribution of limited fuel supplies.

Where one group's recommendations conflict with another's, work toward a resolution of differences making whatever compromises are necessary to satisfy the most people.

9. Develop a chart to indicate cost, adequacy, technological readiness, reliability, environmental hazards, and future potential for the following sources of energy:

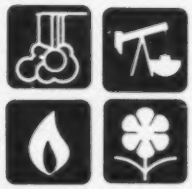
Offshore Drilling
Oil Shale
Solar
Nuclear
Wind
Geothermal
Coal Gasification
Coal Liquification
Pyrolysis
Hydrogen

10. Ask students to keep an energy log for one day, checking each time they:

- use energy directly—turn on an appliance.
- use energy indirectly—run hot water or use ice cubes.
- use public energy—ride the bus or use lights in a public building.
- use a product made of petrochemicals—synthetic fabrics or plastic wraps.
- use a product which requires energy to manufacture—shoes, furniture, appliances, etc.

Be particularly alert to hidden energy consumption—the uses that are not obvious. Go over the energy logs and check off unnecessary uses of energy. Based on the logs, list the 25 or 30 most frequent uses of energy and arrange them in order, from most necessary to least necessary.

11. If, and as they apply, carry out the preceding group projects in connection with water shortages. In addition, contact the Water Resource Council, 2120 L Street, NW, Washington, DC 20037 for information on water supplies.



INTERDISCIPLINARY PROJECTS

The following projects and activities are directed to individual subject matter areas. Choose those which are most appropriate for the subject you teach, or, if desired, incorporate them into an interdisciplinary school program on the three Es.

Art

1. Make posters and bulletin board displays showing various aspects of the energy situation. Arrange to show these in the school, and if possible, in public buildings and retail stores in the community.

2. Draw cartoons on the energy shortage for publication in the school and/or local newspapers. Cartoons could show humorous aspects of conserving energy or possibly some of the incongruities of "little savings" versus "massive waste."

3. Carry out similar activities on ecology and economic concerns related to energy.

English

1. Write essays, editorials, and short stories on the energy situation. Submit these to the school and/or local papers. Possible topics are:

- Why I prefer small cars
- Conserving energy is the best thing that ever happened at our house
- Opportunity costs applied to the energy shortage
- Car pools—a great way to meet people and make friends
- Advantages to the 55 mile-an-hour speed limit
- Water, Water Everywhere—Save a Drop to Drink

2. Make up humorous slogans on conserving energy such as "Eat a cold meal tonight," or "Skip a hot bath today." Involve the art department in making posters to illustrate the slogans.

Science

1. Research and report on expected future sources of energy and the advantages and disadvantages of each. Include geothermal power, nuclear power, shale oil, gasification of coal, and solar energy. Discuss in particular the economic, technological, and environmental difficulties involved in developing each of these sources.

2. Write brief papers explaining the meaning of certain technical energy terms such as fossil fuels, energy efficiency ratio, British thermal unit, watt and kilowatt, geothermal and nuclear. Compile the information as a dictionary of energy terms or write it for publication as an article.

3. Explore and report on the possible environmental consequences of a full-scale fuel discovery and production program.

4. Research and report on desalinization technology as an answer for water shortages. Consider feasibility, practicality, and cost.

History

1. Compare the current energy situation with previous shortages of critical commodities in the U.S. and previous shortages in other nations. How do the situations differ? How are they similar? What new elements need to be considered in the current situation? What can we learn from the past?

2. Report on the gas rationing program during World War II. How did it work? What were the major problems? What were the costs of administering the program? How does the situation differ today?

3. Investigate and report on the environmental movement and its connection with the use and production of energy. Which threats to the environment can be traced to energy production? To energy usage? What environmental sacrifices have been made and may be necessary in the future to produce more energy? What ecological imbalances and environmental problems have resulted unnecessarily?

4. Draw a timeline from 1800 to the present to illustrate major inventions and events related to energy. Draw a similar timeline from 1900 to the present covering major events in the ecology movement. Include approximate year that different threats to the environment were recognized as well as action taken and laws passed to deal with energy-related environmental problems.

Economics

1. Debate the benefits and short-comings of the following two approaches to the energy shortage:

- A system of rationing, legislation, and government action to insure equitable distribution of scarce fuels, an increased production, and the development of alternate sources.

Versus

- Free market system of rising prices for scarce fuels which would dampen demand, stimulate increased production through new technology, and hasten the search for cheaper substitutes and alternate sources of energy.

2. Collect statistics on current sources and uses of energy. Prepare charts to illustrate—

- where we get energy
- how we use energy
- how much energy is wasted
- which segments of the economy use the greatest amount of energy
- the types of fuels used for different end uses

Conduct a similar project on water shortages.

3. Review the following headlines:

"Coal Union Settlement, Coal Prices Escalate"

"Congress Votes to Continue Natural Gas Price Controls"

"Import Quotas Established for Foreign Oil"

"Solar Research and Development Funding Cut 20%"

"Environmentalists Block Offshore Drilling"

Consider each of these headlines and find at least five similar ones in current newspapers. Discuss what each event could mean in terms of:

- overall energy prices
- prices of different fuels
- prices of other goods and services
- environmental protection
- development of new domestic energy sources

Ask students to assume one of the following roles and to assess what effect these events would have on each one and how each might react:

- producer of natural gas
- leader of environmental group
- coal company president
- manufacturer of offshore drilling equipment
- electric utility company official
- consumer
- top executive of an oil company with foreign oil interests

4. Make the obvious and the hidden connections between the energy situation and the following economic concepts:

- inflation
- trade deficit
- productivity
- price mechanism
- supply and demand
- trade off
- opportunity cost
- international trade

Home Economics

1. In a crystal ball session, have students predict lifestyle changes that a long-term energy shortage could bring about which would affect: personal values and goals, family life, and homemaking. Discuss the pros and cons of predicted changes —would they be good for us as a nation and as individuals, or would they impose possible destructive tensions and hardships? What new concepts might these changes bring to family life and home economics education?

Conduct a similar crystal ball session for water shortages.

2. Investigate the power consumption of different home appliances in terms of:

- energy efficiency ratio
- operating costs
- average kW·h consumed per year by various appliances
- conservation possibilities

Study water consumption and conservation possibilities for home appliances, too.

3. Determine ways to conserve energy in the home in heating, cooling, use of appliances, and lighting. Estimate their value in saving energy and lowering utility bills.

Driver Training

1. Compile information and make it available to the student body via the school paper, bulletin boards, and posters about the relationship between proper automobile tune-ups and improved mileage.

2. Write and send to school and local papers an article on driving

habits that conserve fuels and increase mileage.

3. Conduct research and interviews with auto executives and transportation experts on the following topics:

- auto design and fuel economy
- effects of the 55 mph speed limit
- improving public transportation
- emission controls and fuel economy
- allocation of public funds for mass transit vs. highway improvements vs. energy research and development

Consumer Education

1. Categorize, using the following headings, the ways consumers may be most severely affected by fuel shortages:

- use of home appliances
- use of automobiles
- purchase of new consumer goods
- heating and cooling houses
- taking vacations
- beating inflation

2. Predict the ways in which consumer choices and spending patterns may change in these categories as a result of an energy shortage:

- foods
- clothing and textiles
- autos
- home appliances
- travel
- insurance
- home maintenance and improvement
- entertainment

3. Call the office of your state and national legislators for information about legislation that is pending or recently passed that is related to the three Es. Ask for copies or summaries of the bills and determine which proposals would affect consumers for better or worse. Report findings to the class.

4. Review your own consumer spending over the last six months to determine what, if any, choices were made wholly or partly due to the energy situation. Can you foresee any buying decisions that may change due to an energy shortage?

Student Body Activities

Student body activities offer an opportunity for the entire school to participate and, at the same time, to use the activity in such a way as to make an informative contribution to the community. Select projects that are appropriate and challenging to your group.

1. Conduct a publicity campaign using newspapers, posters, bulletin boards, public meetings, and fliers to create public awareness of the energy situation, to inform people of ways to conserve energy, and to motivate conservation.

2. Set up a resource center in the school with up-to-date information on energy usage, conservation, supplies, demand and legislation.

3. Set up conservation projects to be carried out by the student body. Suggestions are:

- a car pool number to call for arranging rides and cutting down on the number of drivers
- a "save a watt" answering service to answer questions on ways to save energy (this can be manned on certain hours during the day and publicized in the community)
- prepare and publish a booklet "Ways to Save Energy" in the house, in the school, in the car, in stores, and in the community

4. Recycling can be both an energy saver and environmental safeguard. For many products it requires less energy to recycle glass, paper, and metals than to make them from scratch. New developments in use of trash for fuel and building materials make recycling even more desirable. In addition, recycling reduces solid waste disposal problems. In the interests of both energy and environmental protection, set up a recycling collection center for paper, glass, and metals, particularly aluminum. For help in setting up a center, turn to existing local and regional recycling programs and environmental groups.

5. Set up water saving guidelines for:

- individual families
- schools
- communities
- industry
- agriculture

Distribute these guidelines or publish them in the school or local newspaper. Concentrate on the first three which students and families can carry out.

ELEMENTARY AND MIDDLE SCHOOL ACTIVITIES

Activities appropriate for younger students to learn about the energy situation will allow them to work at their own speed, follow their own interests, and at the same time, learn to work together. Choose and modify the activities to meet the needs and ability levels of your students.

Lower Grades One to Four

1. Arrange field trips for students to see and learn firsthand about energy and ecology concerns. Places to visit would include:

- utility companies
- power plants
- recycling centers
- water purification plants
- city dump
- air and water testing stations
- beautification projects
- a solar heated home or building

Plan each field trip with specific goals, learning objectives, questions to ask, and things to look for. Follow up with discussion and class or individual projects related to the field trip. For example, before or after a trip to a recycling center, collect items to be recycled. After a trip to a beautification project, carry out a class beautification project at the school or in the community.

2. Put together an "Energy Eaters in Your Home" bulletin board or a display of 10 to 15 commonly used energy consuming products such as dishwashers, water heaters, clothes washers and dryers, freezers, refrigerators, ranges, television sets, etc. Show the average kilowatt hours consumed annually by each applicance.

3. Draw up "I Can Do It Myself" lists of ways each person can save energy, save water, and protect the environment. For example:

I CAN DO IT MYSELF

To Save Energy

- walk or bike instead of driving
- turn off lights not in use
- turn off television when finished

To Protect The Environment

- use less water for a bath
- save papers, glass, and metals to recycle

To Save Water

- take a shower instead of a bath
- shorten showers
- turn faucets completely off

4. Introduce youngsters to key energy and ecology terms and related economic concepts. Start with the following and add to the lists as comprehension and reading levels progress. For vocabulary building, try an energy word-of-the-week or word-of-the-day with each student taking a day to bring in a word for the class. A beginning vocabulary might include:

Energy

watt	nuclear power
kilowatt	conservation
fossil fuel	electricity
solar energy	

Ecology

recycle	solid waste
pollute	environment
pollutant	

Economics

supply	import
demand	export
scarcity	

5. List and make posters illustrating at least five conservation measures that save both water and energy.

6. Set up a committee on resource conservation to keep up with news connected with resource shortages, conservation programs, problems, and possible solutions. Allow time for the committee to report to the class once each week.

Middle Grades Five Through Eight

1. Investigate local sources of power—electricity, gas, fuel oil. Find out how most homes and buildings in the community are heated, where power comes from, peak usage periods, heaviest energy users, price structures for electricity and gas, wasteful

uses, ways to conserve, and other pertinent information related to energy use in the community. Write findings in a "Did You Know" report for the school or local paper.

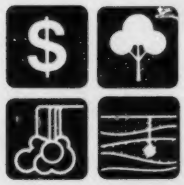
2. Carry out a community study of water and air pollution problems, land use and abuse, zoning laws and building codes with particular emphasis on how any of these relate to energy use and demands. Discuss findings and look for possible solutions and policies for dealing with problems.

3. Plan and organize school- or community-wide energy conservation and environmental protection projects such as "Clean Up the Park Day," "Save a Watt Week," "Recycle Rubbish." For example, to launch an energy conservation project, students might put together and run off copies of energy-saving tips and distribute them at school, the public library, supermarkets, and bus and train stops.

A similar project can be planned for water conservation.

4. Work with the local park district or garden club or environmental group to set up a bike and hike path, establish a recycling collection center, run a week-long hot line, or a weekly column on energy and water savers.

5. Make a survey of local businesses to learn how they have been or would be affected by serious fuel shortages over a long period of time, what they have done or would be willing to do about recognized environmental problems in the community, what energy saving practices they could put into use.



6. Develop a "Three-E Aptitude and Awareness" test for parents and other adults designed to present important facts on the three Es and to motivate adult awareness of problems and conditions related to the three Es. Include questions on energy such as average annual kilowatts used by common appliances, local rates for electricity and gas, and ways to save energy when driving. On ecology, cover both local and national environmental concerns related to energy and economics. In economics, use questions on the economic consequences and happenings related to energy shortages, uses, and production. Circulate the test, tabulate the answers, and report on the results.

7. Conduct a study to learn what the water supply demand is in a community. Find out about:

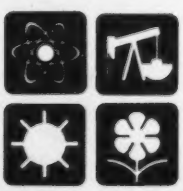
- Current and predicted water levels
- Rate structures
- Sources of water
- Use of water—particularly the breakdown among residential, communities, industrial, and agricultural

RESOURCES

Information on the three Es is available from a variety of sources —associations, government agencies, businesses, as well as newspapers and magazines. Most sources listed in this section distribute information on one or all of the three Es.

One student from your class might write several of the sources on behalf of the class, asking for publications or a listing of materials available and the prices (as not all materials are free).

A search through the vertical index in the school or public library will produce sources of recent articles and students can bring in articles appearing in newspapers and magazines.



ASSOCIATIONS, INSTITUTES, COUNCILS

Air Pollution Control Association
P.O. Box 2861
Pittsburg, PA 15230

American Gas Association
1515 Wilson Blvd.
Arlington, VA 22209

American Iron and Steel Institute
1000 16th St.
Washington, DC 20036

American Petroleum Institute
2101 L St., N.W.
Washington, DC 20037

Center for Science in the Public Interest
1757 S St., N.W.
Washington, DC 20009

Concern, Inc.
2233 Wisconsin Ave., N.W.
Washington, DC 20007

Chamber of Commerce of the United States
1615 H St., N.W.
Washington, DC 20062

Committee for Economic Development
477 Madison Ave.
New York, NY 10022

Edison Electric Institute
90 Park Ave.
New York, NY 10016

Electric Energy Association
90 Park Ave.
New York, NY 10016

Electrification Council
90 Park Ave.
New York, NY 10016

Ford Foundation
320 E. 43rd St.
New York, NY 10017

Institute of Gas Technology
3424 State St.
Chicago, IL 60616

Joint Council on Economic Education
1212 Avenue of the Americas
New York, NY 10036

Motor Vehicle Manufacturers Association
of the United States
320 New Center Building
Detroit, MI 48202

National Association of Electric Companies
1140 Connecticut Ave., N.W.
Washington, DC 20036

National Association of Securities Dealers, Inc.
1735 K St., N.W.
Washington, DC 20006

National Business Education Association
1906 Association Dr.
Reston, VA 22091

National Coal Association
1130 17th St., N.W.
Washington, DC 20036

National Science Teachers Association
1742 Connecticut Ave., N.W.
Washington, DC 20009

Resources for the Future, Inc.
1755 Massachusetts Ave., N.W.
Washington, DC 20036

Sierra Club Foundation
Educational Materials
530 Bush St.
San Francisco, CA 94108

Tax Foundation, Inc.
50 Rockefeller Plaza
New York, NY 10020

The American Bankers Association
1120 Connecticut Ave., N.W.
Washington, DC 20036

The Conference Board
845 Third Ave.
New York, NY 10022

The Conservation Foundation
1717 Massachusetts Ave., N.W.
Washington, DC 20036

U.S. National Commission of the World
Energy Conference Engineers Joint Council
345 East 47th St.
New York, NY 10017

17

BUSINESS AND COMMERCIAL ORGANIZATIONS

American Stock Exchange, Inc.
86 Trinity Pl.
New York, NY 10006

Amoco Oil Co.
200 E. Randolph
Chicago, IL 60601

Chicago Board of Trade
141 West Jackson Blvd.
Chicago, IL 60604

Chicago Mercantile Exchange
444 West Jackson Blvd.
Chicago, IL 60606

Dow Jones & Company, Inc.
The Educational Services Bureau
P.O. Box 300
Princeton, NJ 08540

Dun & Bradstreet, Inc.
99 Church St.
New York, NY 10007

McDonald's Corporation
2111 Enco Dr.
Oak Brook, IL 60521

Merrill Lynch, Pierce, Fenner & Smith, Inc.
One Liberty Plaza
165 Broadway
New York, NY 10080

Morgan Guaranty Trust Company
of New York
23 Wall St.
New York, NY 10015

National Petroleum Council
1625 K St., N.W., Suite 601
Washington, DC 20009

New York Stock Exchange
11 Wall St.
New York, NY 10005

PUBLICATIONS

American Scientist

Audubon

Baron's National Business and Financial Weekly

Black Enterprise

Business and Society Review

Business Week

Forbes

Fortune

Environment

National Geographic

Physics Today

Popular Science

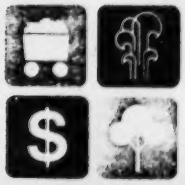
Science

Scientific American

Search, Special Science and Environmental Research

The Science Teacher

GOVERNMENT AGENCIES



Department of Commerce
Bureau of Census
Social and Economic Statistics Administration
Smithland, MD 20233

Department of Commerce
Building Research Division
14th St. between E St. and Constitution Ave., N.W.
Washington, DC 20230

Department of Energy
Federal Power Commission
Energy Research and Development Administration
12th St. and Pennsylvania Ave., N.W.
Washington, DC 20004

Department of Health, Education and Welfare
330 Independence Ave., S.W.
Washington, DC 20201

Department of Interior
C St. between 18th and 19th St., N.W.
Washington, DC 20240

Department of Labor
Bureau of Labor Statistics
200 Constitution Ave., N.W.
Washington, DC 20210

Department of Transportation
400 Seventh St., S.W.
Washington, DC 20490

Environmental Protection Agency
401 M St., S.W.
Washington, DC 20460

Federal Reserve Bank of
Atlanta, GA 30303
Boston, MA 02106
Chicago, IL 60690
Cleveland, OH 44101
Dallas, TX 75222
Kansas City, MO 64198
Minneapolis, MN 55480
New York, NY 10045
Philadelphia, PA 19105
Richmond, VA 23261
St. Louis, MO 63166
San Francisco, CA 94120

Federal Trade Commission
Pennsylvania Ave. at Sixth St.
Washington, DC 20580

Internal Revenue Service
Department of the Treasury
Washington, DC 20224

National Bureau of Standards
Washington, DC 20234

Office of Consumer Affairs
Department of Health, Education and Welfare
330 Independence Ave., S.W.
Washington, DC 20201

Small Business Administration
1441 L St., N.W.
Washington, DC 20416